Reg. No.

A Constituent Institute of Manipal University, Manipal

V SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER

EXAMINATIONS, NOVEMBER 2017

SUBJECT: PLANT LAYOUT AND MATERIAL HANDLING [MME 4030]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

- **1A.** With a neat sketch explain the type of layout used for continuous production and also mention **04** its merits and demerits.
- **1B.** Mention the six principles of plant layout and explain any three of them.
- 1C. A manufacturer has to choose from the three machines for his factory. An automatic machine 03 which will add Rs.20,000/- a year to fixed cost but the variable cost per unit is only 40 paise. A semi-automatic machine which will add Rs.8,000/- a year to his fixed cost but the variable cost per unit is Rs.2/-. A hand operated machine which will add only Rs.2,000/- a year to his fixed cost but the variable cost per unit is Rs.4/-. By graphically illustrating, determine the range of output over which automatic, semi-automatic and hand operated machines would be most economical.
- **2A.** What are the considerations that affect the movement factor? Explain any four of them.
- **2B.** List the services relating to men and explain any three of them.
- 2C. A machine shop has received a work order to supply specimens for three clients. The shop 03 makes different types specimens. The processing time to make each specimen depending upon various factors. The shop operates 250days in a year with 8 hours per shift and on two shift basis. Determine the required capacity to meet the demand using the information given below:

Particulars	Client-A	Client-B	Client-C
Annual Demand (units)	1500	5000	2500
Processing Time (Hour/Unit)	0.35	0.6	0.7
Lot Size (units)	20	40	50
Set up time (Hour)	0.2	0.35	0.4

- **3A.** Describe the flow diagram with a neat sketch and suitable industry example.
- 3B. What are the ten fundamentals to guide the work of planning layout?

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3C. Following information is given in the table below:

Task	A	В	С	D	E	F	G	Н
Immediate predecessor	None	А	В	С	С	D,E	F	G
Task time (Minutes)	0.9	0.4	0.6	0.2	0.3	0.4	0.7	1.1

Draw a precedence diagram and assign the tasks to workstations using the longest task time rule, Assume cycle time=1.1minute per unit.

- **4A.** Explain with neat sketches Overhead trolley conveyor and Half-gantry crane.
- **4B.** State and explain the methods of layout evaluation.
- 4C. A supplier to the electric utility industry has a heavy product and the transportation costs are 03 high. More than 600000 Tonnes are to be shipped to 8 major customer locations whose X-Y co-ordinates and quantity shipped are as shown in the table below:

Customer Location	А	В	С	D	Е	F	G	Н
Tonnes shipped	5000	92000	70000	35000	9000	227000	16000	153000
X-Y Co- ordinates	(07,13)	(08,12)	(11,10)	(11,07)	(12,04)	(13,11)	(14,10)	(15,05)

Management has proposed two locations for their new centre. One based on centre of gravity i.e. (12, 9) and other one is at location "H". Find the optimum location for new facility based on Load-distance score.

- **5A.** Explain any six principles in material handling.
- **5B.** What is the function of packaging? Explain. And list the principles of packaging.
- 5C. A company has manufacturing plants at four different locations with production capacity 50, 30, 03 40, and 30 tonnes. The company has to deliver their goods to their retails outlets with at least 40, 20, 50, and 40 tonnes respectively on daily basis. Table below shows the transportation costs (in Rs.)

Compony	Retail outlets						
Company	Retailer-1 Retailer-2 Retail		Retailer-3	Retailer-4			
Plant-1	3	5	7	6			
Plant-2	2	5	8	2			
Plant-3	3	6	9	2			
Plant-4	4	3.5	6.5	8.5			

Determine the optimum transportation cost using least cost method.

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